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NEW SOVIET TUNNELING MACHINES INCLUDE MOLE-LIKE DEVICE

DESIGN EVOLVED FROM X-RAY STUDIES OF ANIMAL IN ACTION -- Moscow, Smena, No 21, Nov 51

One day in the summer of 1947, in an old open mine at the foot of Blagodat' Mountain in the Urals, Aleksander I. Trebelev climbed through a side hatch into a strange cigar-shaped machine which had a powerful boring element at the nose and special jack-operated fins (plavniki-domkraty) at the rear. He started the motor, and the machine began to burrow into the mountain.

This machine, which Trebelev himself had designed, is called an "undergroud boat." On the first day of the tests the machine advanced one meter. On the second, it penetrated 2 meters into the ground, and on the third day, it advanced 5 meters. It simply entered the ground and disappeared. The success of the Blagodat' tests constitute a milestone in Soviet technology.

The first model of the underground boat was equipped with a spiral element around the periphery of the mid-section. The rotation of this spiral packed the excavated earth against the walls of the tunnel. /A photograph of the first model of the underground boat, taken at the Blagodat' site, appears on page 18 of the source. It is not made clear whether this is the man-carrying machine which Trebelev tested in the summer of 1947./

Trebelev designed his underground boat after viewing X-ray pictures of a mole making its way through the ground. He observed that the animal moved its head from side to side in a sort of boring motion, while it propelled itself forward with its powerful hind legs. It was noted that the mole packed the loose earth it had excavated against the walls of its tunnel by expanding its neck muscles. This action of the neck muscles was one of the most important influences on the design of the underground boat, and it was to duplicate the function of the mole's neck that the spiral element was built into the machine.

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Another important factor in the evolution of the underground boat was the discovery by Soviet scientists that great speeds reduce resistance to cutting. Thus, the first model was powered by electric motors of only 40 /horse/power, but which had very high speeds of revolution. These motors were small and light enough to fit into the machine.

The advent of the underground boat has opened up an entirely new branch of science, known as terrodynamics. This science foresees the day when underground navigation and exploration will be carried out at great depths. Future underground boats will be outfitted with such navigational aids as echo sounders, gyrocompasses, and inclinometers. They will be powered by storage batteries, and will have supplies of oxygen for emergencies. There will be special ports which can be opened underground for taking earth samples. The crew will consist of a captain and a helmsman. Surface remote control is also planned.

For the immediate future, the underground boat is to be employed in excavation work for laying gas and heating mains and similar underground work.

A third model of the underground boat is now being built in the shops of a Moscow Plant of the Mosgazstroymekhanizatsiya Trust (Moscow City Administration for the Construction of Gas Networks). It is much better than the first two models, embodying improvements arrived at from observing the tests of the previous machines.

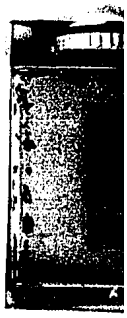
Moscow, Moskovskaya Pravda, 27 Dec 51

The Moscow Plant of Mosgazstroymekhanizatsiya has built a cigar-shaped construction machine, 5 meters long, 1½ meters in diameter, and weighing 1½ tons. It is equipped with powerful boring elements having hard-alloy cutting edges. In the rear are four jack-operated fins, which work in alternate pairs, pushing against the walls of the bore to propel the machine forward. It advances at 10-12 meters per hour. The operator, inside the machine, can change the direction of travel by stopping or reversing one of the fins.

This machine will greatly advance underground construction work in laying out city communications systems, gas and water mains, and sewers. Tests of the first two models of the machine gave satisfactory results. It was found that they could penetrate not only soft earth, but also hard rock, including granite. Even through granite, the machine will be able to advance at a speed of one half meter per hour.

NEW TUNNELER TO SIMPLIFY PIPE LAYING -- Moscow, Vechernyaya Moskva, 5 Jul 51

One of the most remarkable machines which the Moscow Drilling Machinery Plant has developed for the petroleum industry is a new pipeline tunneler, invented by Engineer Sidorov. Essentially, the device consists of a long pipe of large diameter, to the end of which is attached a special crown, fitted with teeth and blades. When the pipe is rotated, this crown cuts into the earth. A conveyer belt running down the center of the pipe removes the earth as the crown piece cuts it away. The tunneler is designed primarily for cutting passages through railroad embankments and under roads, so that pipelines can be put through without disrupting the overhead structures. After the bore is completed, the crown is removed from the pipe, and the pipe is left in place as a protective sheathing for the pipeline. The first model of the device has been tested and returned to the plant for minor improvements.



The plant is preparing to launch series production of a special mechanism which rotates large-diameter oil pipe while it is being machine welded.

Other products of the plant are machines for drilling artesian wells, mortar mixers and pumps.

COMPLETE NEW TUBE LAYER -- Moscow, Moskovskaya Pravda, 23 Nov 51

The Moscow Mashinostroitel' Plant of the Ministry of Transportation has completed the assembly of a new tube layer, designed for laying the segmented metal walls of subway tubes. The machine is electric powered, and can work behind a tunneling shield. It has undergone tests and has been accepted by a state commission.

Moscow, Vachernyaya Moskva, 20 Dec 51

The tube layer built by the Moscow Mashinostroitel' Plant has a special metal arm mounted at the front, which picks up the segments of metal tubing and deposits them in place. The machine runs on a 30-meter track, moving gradually forward as it completes the installation of successive sections of the tube. After it has reached the end of the track section, it raises itself from the rails by means of four hydraulically operated shoes, after which it seizes and lifts the rail section, by means of special gripping device, and moves it forward for the next run. It then settles back down onto the rails.

The machine is now being used in the construction of the Moscow subway.

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